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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

DURING THE CALENDAR YEAR 1919

BY

WILLIAM W. ADAMS

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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1919.

By William W. Adams.

INTRODUCTION.

Information received by the Bureau of Mines from operators of metallurgical works covering the calendar year 1919 shows a considerable decrease in the number of men employed and the number of fatal and nonfatal injuries, as compared with 1918. The reports show that 60,187 men were employed, and that 62 were killed and 8,045 were injured, representing an accident rate of 0.98 killed and 127.10 injured per thousand persons employed (300-day workers). The working time for all employees was equivalent to 18,988,568 man-days of labor. These figures indicate a decrease of 19,565 employees, 32 fatalities, 4,648 injuries, and 7,431,179 days of labor, as compared with the record for the previous year.

Of the total number of accidents reported 25 fatalities and 2,052 injuries occurred at ore-dressing plants, 32 fatalities and 4,394 injuries at smelters, and 5 fatalities and 1,599 injuries at auxiliary works.

Table 1 presents a summary of the principal data relating to accidents at ore-dressing plants, smelters, and auxiliary works for each year since 1913, the first year for which statistics of this character were compiled by the Bureau of Mines.

Table 1.—*Summary of labor and accidents at metallurgical plants.*

	Men employed.		Days of labor performed.	Average days active.	Total number killed.	Number killed per 1,000 300-day workers.	Total number injured.	Number injured per 1,000 300-day workers.
	Actual number.	300-day workers.						
Ore-dressing plants:								
1913	14,985	16,154	4,846,338	323	16	0.99	1,977	122.38
1914	15,128	15,225	4,567,529	302	23	1.51	1,434	94.19
1915	18,564	19,107	5,732,184	309	30	1.57	2,095	109.65
1916 [a]	22,365	23,470	7,041,083	315	33	1.41	3,184	135.66
1917 [a]	24,111	24,372	7,311,499	303	47	1.93	2,952	121.12
1918 [a]	21,809	22,517	6,754,962	310	35	1.55	3,142	139.54
1919 [a]	17,128	16,708	5,012,490	293	25	1.50	2,052	122.82
Smelting plants: [b]								
1913	20,564	24,309	7,292,766	355	47	1.93	4,247	174.71
1914	27,879	32,336	9,700,769	348	33	1.02	5,673	175.44
1915	31,327	36,262	10,878,486	347	38	1.05	5,718	157.69
1916 [a]	43,829	49,363	14,809,046	338	36	.73	9,656	195.61
1917 [a]	44,376	50,659	15,197,643	342	53	1.05	7,745	152.88
1918 [a]	39,899	45,439	13,631,601	342	42	.92	6,743	148.40
1919 [a]	28,417	30,917	9,275,142	326	32	1.04	4,394	142.12
Auxiliary works:								
1913,1914,1915 [c]								
1916	14,007	15,763	4,729,010	338	14	.89	2,240	142.10
1917	15,555	17,014	5,104,146	328	16	.94	2,881	169.33
1918	18,044	20,111	6,033,184	334	17	.85	2,808	139.63
1919	14,642	15,670	4,700,936	321	5	.32	1,599	102.04

[a] Not including auxiliary works, as shops, yards, etc.
[b] Exclusive of iron blast-furnaces.
[c] Not separately reported.

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From the figures in the foregoing table it may be noted that the general decline in the output of principal metals in 1919—a natural reaction from the unusual activity in 1918 caused largely by the war—was reflected in the metallurgical industry in the smaller number of workers and in the reduced period of their employment. A reduction of 24.53 per cent is noted in the number of employees in 1919, as compared with the preceding year, and 28 per cent in the total number of man-days of labor performed. Nevertheless, after proper allowance is made for these reductions and due consideration is given to the period of employment—that is, to the length of time the workers were exposed to the hazards of their occupations—the figures for 1919 show a decrease in both the fatality and injury rates. The fatalities declined from 1.07 to 0.98 and the injuries from 144.13 to 127.10 per thousand 300-day workers at all metallurgical plants combined (smelters, ore-dressing plants, and auxiliary works). The decrease in the accident rates for 1919 may otherwise be described by the statement that if the rates for 1918 had continued during the following year, 5 more men would have lost their lives and 1,078 more men would have been injured in addition to those who were actually killed and injured during the year covered by this report.

Tables 6 and 7 summarize by States and causes all accidents in 1919 in the metallurgical industry of the United States (exclusive of accidents at iron-blast furnaces) as shown by reports received by the Bureau of Mines.

ACKNOWLEDGMENTS.

The Bureau of Mines gratefully acknowledges the cooperation of the owners and operators of metallurgical plants and of others interested in the metallurgical industry who have voluntarily furnished the data upon which the tables in this report are based. Such cooperation if continued from year to year should result in the more prompt publication of reports relating to accidents at metallurgical works, as well as in more accurate, complete, and therefore more representative figures.

Data for California and Colorado, respectively, were furnished by the Industrial Accident Commission and the State commissioner of mines. Statistics for South Dakota were furnished by Otto Ellerman, State mine inspector, and for Nevada and Utah by the Industrial Accident Commission. For assistance in the compilation of the various tables the author is indebted to Miss L. S. Gerry and Miss Mary Bringhurst of the Bureau of Mines.

SCOPE OF STATISTICS.

The tables in this publication have been compiled by the Bureau of Mines from reports furnished voluntarily and directly by operators of ore-dressing plants and smelters throughout the United

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States, with the exception of information for the States of California, Colorado, Nevada, South Dakota, and Utah, which was furnished by the State inspector or by the State Industrial Commission. The statistics herein presented, although not altogether complete, represent the entire metallurgical industry, except iron-blast furnaces, for which accident reports are not received by the Bureau of Mines. The figures for smelting plants cover copper, lead, gold, and silver smelters and refineries; those for ore-dressing plants represent concentrating plants for copper ores, lead ores, zinc ores, stamp mills, cyanide plants, iron-ore washers, flotation mills, and sampling works.

CLASSIFICATION OF ACCIDENTS.

As a step toward uniformity in the statistical presentation of the hazards of the metallurgical and mining industries the Bureau of Mines in 1916 classified the nonfatal injuries on a 14-day (2 weeks) basis, thus conforming with the classification adopted in the compensation laws of many States. A summary of accidents at mills, smelters, and auxiliary works on this basis for 1916 to 1919 follows:

Fatal and nonfatal accidents, 1916–1918.

	1916	1917	1918	1919
1. Fatal	83	116	94	62
2. Serious (time lost, more than 14 days):				
Permanent disability—				
Total [a]	17	5	7	2
Partial [b]	200	202	247	71
Others	3,443	3,302	3,028	[c] 1,835
3. Slight (time lost, 1 to 14 days, inclusive)	11,420	10,069	9,411	6,137
Total nonfatal injuries	15,080	13,578	12,693	8,045
Grand total (fatal and nonfatal)	15,163	13,694	12,787	8,107
Men employed	80,201	84,042	79,752	60,187

[a] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[b] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[c] "Other serious accidents" in ore-dressing plants, smelting plants, and auxiliary works include 50 cases of permanent partial disability which could not be segregated.

ACCIDENTS AT ORE-DRESSING PLANTS.

According to the reports received, 17,128 men were employed at ore-dressing plants in 1919 as compared with 21,809 in 1918. The plants were active for an average of 293 days, and the total working time was equivalent to 5,012,490 days of labor (Table 2). Accidents caused the death of 25 employees and the injury of 2,052 others, representing a fatality rate of 1.50 and an injury rate of 122.82 for every 1,000 men employed (300 day-workers).

The corresponding rates for the previous year were 1.55 killed and 139.54 injured per 1,000 men employed.

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The principal cause of fatal accidents at ore-dressing plants continues since 1914 to be "other machinery," that is, machinery other than crushers, rolls, stamps, tables, and jigs (Table 8). The same cause also resulted in the greatest percentage of nonfatal injuries in 1919, although the number of such injuries during previous years (since 1916) has been exceeded by two other causes, namely, falls of persons and falling objects.

Accidents due to all kinds of machinery at ore-dressing plants (including crushers, rolls, stamps, and jigs) were responsible for 32 per cent of the total number of fatalities and over 21 of the nonfatal injuries. It may be noted from Table 8 that nonfatal injuries caused by machinery form a much larger percentage of the total number of accidents at ore-dressing plants than at smelters, owing, no doubt, to the wider use of machinery in ore-dressing operations than in smelting.

ACCIDENTS AT SMELTERS.

The number of persons reported employed at smelters in 1919 was 28,417 as compared with 39,899 in 1918. The men were employed for an average of 326 days each, or a total of 9,275,142 man-days for all employees (Table 2). The fatalities and injuries were 32 and 4,394, respectively, thus indicating an accident rate of 1.04 killed and 142.12 injured per 1,000 men employed (300-day workers). The corresponding rates for 1918 were 0.92 killed and 148.40 injured per 1,000 men employed.

Of the total number of nonfatal accidents at smelters, over 21 per cent was caused by burns from matte, slag, or molten metal, and more than 16 per cent by flying or falling objects. Of the fatal accidents, 31 per cent was caused by cranes and other machinery, and 18 per cent by haulage equipment.

ACCIDENTS AT AUXILIARY WORKS.

Auxiliary works are intended to include machine shops, carpenter shops, yards, and general construction, all of which, though forming part of the metallurgical plants, should not be included in the actual operating departments.

The number of men reported employed in 1919 was 14,642, of whom five were killed and 1,599 were injured, representing a fatality rate of 0.32 and an injury rate of 102.04 per thousand 300-day workers. The working time of all employees was 4,700,936 days. As compared with the previous year the figures for 1919 show a decrease of 3,402 employees and 1,332,248 days of labor.

The principal causes of nonfatal accidents at auxiliary works were falling objects, hand tools, fall of persons, and machinery.

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ACCIDENTS AT COPPER METALLURGICAL PLANTS.

As the mills and smelters treating copper ores represent such an important part of the metallurgical industry of the United States, as well as a branch that is readily segregated, Tables 15 and 16 have been compiled from the reports of a selected list of copper companies whose records appeared reasonably complete. These figures for 1919 represent 23 ore-dressing plants and 21 smelters in various parts of the country, employing 4,577 men at mills and 8,934 at smelters.

Similar figures for the last five years show that fatal accidents at the smelters of the selected copper companies and similar accidents at all smelters throughout the United States, apparently occur with about equal frequency, although the fatality rate at the mills of the selected copper companies is usually lower than that for all mills indiscriminately. On the other hand the nonfatal accident rates for both mills and smelters operated by the selected copper companies appear slightly higher than the average for all mills and smelters in general.

All companies probably keep fairly complete records of accidents causing death, but it is equally probable that nonfatal injuries (especially those of a slight or minor nature) are not always completely recorded and reported by some of the smaller and less highly organized plants. For these reasons the fatality rates at mills, at least, seem to indicate that improved conditions have followed the adoption of safety measures and practices by those companies which conduct safety campaigns and which maintain safety organizations, as represented by the selected list of copper companies. At the same time, the higher rate of nonfatal injuries at the mills and smelters of the selected copper companies by no means indicates a greater frequency of such injuries at their plants but rather represents a more accurate description of the real accident hazard of the industry, and shows that minor injuries at some of the less highly organized plants are not always included in the reports received by the Bureau of Mines.

IMPORTANCE OF COMPLETE ACCIDENT RECORDS.

Since the enactment of compensation laws by nearly all of the States, increased importance attaches to accuracy and completeness of statistical publications on industrial accidents. The insurance premiums which operators of metallurgical plants, mines, and quarries are called upon to pay are determined largely from a study of statistical reports relating to accidents in these respective industries. It is highly advisable, therefore, that full and accurate data concerning accidents be reported promptly by operators not only to aid in the

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study and prevention of such accidents, but also to assist State compensation commissions and other insurance bodies in establishing premium rates that will be fair and equitable to the industry.

Again, as the value and practical usefulness of statistical reports are increased or diminished by the promptness or tardiness with which the figures are published, it is the hope of the bureau that its annual inquiries relating to accidents may be filled out by all operators and returned as promptly as possible, in order that the reports of the bureau on this subject may be published shortly after the close of the year to which they relate.

STATISTICAL TABLES.

The following tables show the classification and the number of accidents at metallurgical works in the United States during the calendar year 1919.

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TABLE 2.—*Number of men employed, number of days worked, and number of men killed and injured at* **metallurgical plants** *in the United States during the year ended Dec. 31, 1919.*

State.	Ore-dressing plants.					Smelting plants.					Auxiliary works.					Widows.	Orphans.
	Men employed.	Days of labor performed.	Average days active.	Killed.	Injured.	Men employed.	Days of labor performed.	Average days active.	Killed.	Injured.	Men employed.	Days of labor performed.	Average days active.	Killed.	Injured.		
Alabama	203	30,286	149	1	12	.....	.....	.....	.....	.....	78	17,199	221	.....	1	.....	.....
Alaska [a]	375	133,614	356	3	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	2,149	725,921	338	2	448	1,678	560,707	334	5	716	1,905	645,000	339	1	278	4	3
Arkansas	29	7,475	258	.....	.....	712	243,925	343	.....	65	111	35,460	319	.....	5	.....	.....
California [b]	633	155,511	246	1	43	464	115,133	248	1	122	735	182,727	249	.....	.....	2	5
Colorado [c]	1,347	362,217	269	2	64	1,438	524,870	365	1	172	.....	.....	.....	.....	.....	.....	.....
Georgia	21	3,883	185	.....	.....	.....	.....	.....	.....	.....	(d)	.....	.....	.....	.....	.....	.....
Idaho	494	121,734	246	.....	27	(d)	.....	.....	.....	.....	175	58,555	335	.....	26	.....	.....
Illinois	120	33,410	278	.....	24	2,582	832,610	322	.....	408	862	306,459	356	.....	78	.....	.....
Kansas	194	50,629	261	.....	22	791	281,470	356	1	157	56	12,902	230	.....	12	1	1
Maryland	(d)	.....	.....	.....	.....	(d)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	1,795	563,752	314	2	102	764	258,605	338	1	52	(d)	.....	.....	.....	.....	1	1
Minnesota	522	83,016	159	1	34	.....	.....	.....	.....	.....	44	6,978	159	.....	30	.....	.....
Missouri	878	221,938	253	.....	152	1,000	267,727	268	.....	271	1,023	308,702	302	.....	193	.....	.....
Montana	962	312,960	325	.....	77	990	345,289	349	5	104	1,456	447,865	308	.....	133	3	4
Nevada [e]	903	325,020	360	4	51	836	301,590	361	1	28	103	36,870	358	1	35	2	.....
New Jersey	605	179,166	296	1	40	3,002	823,662	274	4	414	2,493	813,313	326	1	108	4	4
New Mexico	587	185,184	315	1	115	(d)	.....	.....	.....	.....	501	166,370	332	.....	61	1	.....
New York	793	224,526	283	3	206	233	62,461	268	.....	4	282	76,024	270	.....	32	.....	.....
North Carolina	43	10,207	237	.....	14	.....	.....	.....	.....	.....	(d)	.....	.....	.....	.....	.....	.....
Oklahoma	1,071	287,584	269	3	213	2,161	735,200	340	.....	544	381	116,121	305	1	74	2	2
Oregon	95	19,798	208	.....	7	(d)	.....	.....	.....	.....	26	7,571	291	.....	.....	.....	.....
Pennsylvania	52	13,425	258	.....	2	3,138	1,081,704	345	.....	382	1,632	579,571	355	.....	135	.....	.....
South Dakota [f]	288	92,227	320	.....	17	.....	.....	.....	.....	.....	620	172,327	278	.....	.....	.....	.....
Tennessee	206	49,565	241	.....	26	204	67,350	330	1	130	438	143,248	327	.....	131	.....	.....
Texas	(d)	.....	.....	.....	.....	492	174,764	355	.....	99	235	84,379	359	.....	.....	.....	.....
Utah [g]	1,382	483,852	350	1	205	1,832	667,450	364	4	265	709	258,652	365	.....	80	.....	.....
Vermont	66	16,420	249	.....	1	.....	.....	.....	.....	.....	(d)	.....	.....	.....	.....	.....	.....
Virginia	648	158,846	245	.....	38	231	49,757	215	.....	2	62	17,558	283	.....	6	.....	.....
Washington	79	19,302	244	.....	2	1,449	479,405	331	1	71	(d)	.....	.....	.....	.....	1	5
West Virginia	.....	.....	.....	.....	.....	610	189,270	310	.....	83	410	120,481	294	.....	116	.....	.....
Wisconsin	219	58,116	265	.....	40	85	30,059	354	.....	15	84	29,344	349	.....	1	.....	.....
Other States	369	82,906	225	.....	45	3,725	1,182,134	317	7	290	221	57,260	259	1	64	2	3
Total, 1919	**17,128**	**5,012,490**	**293**	**25**	**2,502**	**28,417**	**9,275,142**	**326**	**32**	**4,394**	**14,642**	**4,700,936**	**321**	**5**	**1,599**	**23**	**28**
Total, 1918	21,809	6,754,962	310	35	3,142	39,899	13,631,601	342	42	6,743	18,044	6,033,184	334	17	2,808	44	57

[a] Stamp mills, other than at lode mines, not included.
[b] Figures relating to California, in this and all other tables, were supplied by the Industrial Accident Commission of the State of California, San Francisco, Calif.
[c] Figures relating to Colorado, in this and all other tables, were supplied by Horace F. Lunt, commissioner of mines, Denver, Colo.
[d] Included in "Other States."
[e] Figures relating to Nevada, in this and all other tables, were supplied by the Industrial Accident Commission, Carson City, Nev.
[f] Figures relating to South Dakota, in this and all other tables, were supplied by Otto Ellerman, State mine inspector, Lead, S. Dak.
[g] Figures relating to Utah, in this and all other tables, were supplied by the Industrial Accident Commission, Salt Lake City, Utah.

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TABLE 3.—***Metallurgical plants:*** *Fatalities, by causes and*

State.	Ore-dressing plants.[a]															
	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Crushers, rolls, or stamps.	Tables, jigs, etc.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Falling objects (rocks, timbers, etc.).	Cyanide or other poisoning.	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing.	Other causes.[d]	Total.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alabama	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Alaska	....	....	....	....	1	1	1	....	....	....	....	....	....	....	....	3
Arizona	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	2
Arkansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
California	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
Colorado	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Idaho	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Illinois	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	2
Minnesota	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada	....	....	....	1	....	....	2	....	....	....	....	....	....	....	1	4
New Jersey	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
New Mexico	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
New York	....	....	....	....	1	....	1	....	....	....	1	....	....	....	....	3
North Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oklahoma	....	....	1	....	....	1	....	....	....	....	1	....	....	....	....	3
Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pennsylvania	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Utah	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Vermont	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Virginia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
West Virginia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other States	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total, 1919	....	**2**	**1**	**1**	**6**	**4**	**4**	**1**	**1**	**1**	**2**	....	....	....	**2**	**25**
Total, 1918	4	1	....	....	14	6	2	....	1	....	3	....	....	....	4	**35**

[a] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[b] Blast, reverberatory, and roasting furnaces; convertors, casting department, and refineries.
[c] Yards, shops, construction, etc.
[d] The fatal of 9 fatalities in 1918 classified as "miscellaneous" in columns 15 and 41, include 5 deaths caused by arsine poisoning in a zinc leaching plant. Two of the men were carpenters working in the plant at time of accident.

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States, during the year ended Dec. 31, 1919.

Smelting plants.[b]															Auxiliary works.[c]											
Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Cranes.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Flying or falling objects (rocks, timbers, etc.).	Gas (burns or asphyxiation).	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling).	Hot-metal explosions.	Other causes.	Total.	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Falls of persons.	Falling objects (rocks, timbers, etc.).	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Failure of ladder, scaffold, or other support.	Handling hot materials.	Other causes.[a]	Total.
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1	....	2	....	....	1	....	1	....	....	....	....	....	....	....	5	....	....	....	....	....	....	1	....	....	....	....	1
....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
3	....	1	1	....	....	....	....	....	....	....	....	....	....	1	5	....	....	....	....	....	....	1	....	....	....	....	1
....	....	2	....	1	....	....	....	....	....	....	....	1	....	....	4	....	1	....	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
1	....	....	....	2	....	....	....	....	....	....	....	....	1	1	4	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	1	....	....	....	1	....	....	1	....	....	....	....	2	7	....	....	1	....	....	....	....	....	....	....	....	1
6	....	6	4	4	1	2	1	....	2	....	....	2	....	4	32	....	1	1	....	....	....	3	....	....	....	....	5
8	5	2	13	4	....	....	....	....	3	....	....	4	2	1	42	....	4	....	1	....	....	2	3	2	....	5	17

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TABLE 4.—***Metallurgical plants:*** *Injuries, by causes and*

State.	Ore-dressing plants.[a]															
	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Crushers, rolls, or stamps.	Tables, jigs, etc.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Falling objects (rocks, timbers, etc.).	Cyanide or other poisoning.	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing.	Other causes.	Total.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alabama	....	....	2	....	3	2	....	....	....	....	1	2	....	....	2	12
Alaska	1	5	....	1	5	....	....	1	....	....	1	1	....	....	10	25
Arizona	16	4	11	8	59	50	....	35	1	8	7	46	27	11	165	448
Arkansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
California	3	....	6	2	7	7	....	5	....	1	....	3	3	....	6	43
Colorado	4	....	5	2	14	7	....	11	1	1	1	3	1	1	13	64
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Idaho	....	1	2	1	1	3	....	3	....	1	....	....	....	....	15	27
Illinois	2	3	....	....	2	2	....	4	....	....	1	1	....	1	8	24
Kansas	2	....	2	....	3	2	2	....	....	....	....	4	2	2	3	22
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan	4	5	5	2	15	12	....	9	....	....	....	9	8	7	26	102
Minnesota	2	3	1	....	6	5	....	5	....	....	....	....	....	....	12	34
Missouri	3	3	10	6	30	11	1	12	4	2	3	7	5	3	52	152
Montana	1	1	11	2	14	9	....	7	....	....	....	4	4	4	20	77
Nevada	1	....	2	2	19	8	....	2	1	....	....	2	3	1	10	51
New Jersey	....	1	1	1	6	9	....	1	....	....	....	3	2	1	15	40
New Mexico	5	5	10	9	3	13	....	16	1	2	1	12	7	2	29	115
New York	2	....	11	2	37	18	....	22	....	4	3	26	5	1	75	206
North Carolina	4	1	3	....	2	....	....	2	....	....	....	....	....	....	2	14
Oklahoma	1	2	8	8	29	14	....	27	....	....	....	8	5	79	32	213
Oregon	....	....	....	....	1	1	....	....	2	....	....	1	....	1	1	7
Pennsylvania	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	2
South Dakota	1	....	5	....	....	....	....	2	....	....	....	....	1	....	8	17
Tennessee	1	1	....	....	3	1	....	6	....	2	....	11	1	....	....	26
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Utah	50	6	11	12	16	12	....	7	....	10	4	17	16	20	24	205
Vermont	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Virginia	2	5	1	1	3	4	....	8	....	....	....	4	2	....	8	38
Washington	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	2
West Virginia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin	5	1	1	....	....	4	....	6	....	2	1	1	2	5	12	40
Other States	....	1	....	....	5	3	1	9	1	1	....	2	3	1	18	45
Total, 1919	**110**	**48**	**108**	**59**	**284**	**199**	**5**	**200**	**11**	**34**	**23**	**167**	**97**	**140**	**567**	**2,052**
Total, 1918	107	68	111	92	368	414	11	389	45	15	63	298	165	198	798	3,142

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States, during the year ended Dec. 31, 1919.

Smelting plants.[b]																Auxiliary works.[c]											
Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Cranes.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Flying or falling objects(rocks, timbers, etc.)	Gas (burns or asphyxiation).	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling).	Hot-metal explosions.	Other causes.	Total.	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Falls of persons.	Falling objects (rocks, timbers, etc.).	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Failure of ladder, scaffold, or other support.	Handling hot materials.	Other causes.	Total.
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
41	7	19	52	63	1	102	7	2	7	93	15	134	20	153	716	7	7	18	39	14	38	4	23	3	19	106	278
6	..	..	3	..	..	1	1	..	..	2	..	32	..	20	65	..	1	..	..	..	1	..	..	..	..	3	5
12	1	6	10	11	..	25	4	..	3	8	5	9	6	22	122	..	..	..	..	..	..	..	..	..	..	..	..
21	1	1	6	15	..	32	2	1	2	11	2	18	2	58	172	..	..	..	..	..	..	..	..	..	..	..	..
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	9	1	2	...	2	3	...	5	26
26	4	2	12	25	..	47	10	4	3	21	6	114	6	128	408	13	1	9	14	5	4	2	2	...	4	24	78
30	..	..	4	10	..	8	..	..	..	8	..	53	..	44	157	3	..	..	7	..	..	..	..	..	..	2	12
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	..	1	2	11	..	13	..	1	..	2	..	12	2	6	52	..	..	..	..	..	..	..	..	..	..	..	..
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	..	4	5	..	4	..	7	..	..	8	30
3	1	..	8	9	1	105	4	..	..	8	5	52	7	68	271	1	10	5	26	11	23	1	13	..	6	97	193
24	..	1	3	12	..	9	..	3	3	3	1	11	1	33	104	1	1	23	14	4	7	..	14	1	..	68	133
5	4	..	..	1	..	5	..	..	..	1	..	3	2	7	28	..	3	9	5	1	2	2	3	3	1	6	35
46	13	15	9	40	..	81	6	8	3	17	5	59	16	96	414	12	..	11	27	3	11	2	5	..	7	30	108
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	..	5	13	3	11	..	7	1	1	17	61
...	...	...	...	...	...	3	..	..	..	..	..	..	1	..	4	1	..	3	6	5	6	..	3	1	..	7	32
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	1	..	54	18	..	38	7	2	..	22	6	223	8	143	544	6	2	4	12	7	4	2	7	1	4	25	74
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	2	1	7	30	..	72	10	7	1	43	8	74	2	124	382	7	1	23	23	3	21	...	7	1	7	42	135
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	1	..	4	15	..	28	..	1	5	9	...	33	5	17	130	...	3	17	36	8	21	1	10	2	2	31	131
30	..	..	3	11	..	29	1	1	..	10	...	12	...	2	99	...	...	...	...	...	...	...	...	...	...	...	...
34	4	2	10	23	..	25	2	3	2	43	6	51	6	54	265	9	6	4	10	1	22	1	8	...	2	17	80
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	2	...	...	...	1	...	1	1	1	...	...	2	6
1	..	4	7	10	..	23	2	1	..	1	...	3	1	18	71	...	...	...	...	...	...	...	...	...	...	...	...
3	..	..	2	5	..	5	..	..	..	16	...	42	...	10	83	7	...	10	32	4	14	...	15	2	7	25	116
...	1	..	1	1	..	5	..	1	..	2	...	2	...	2	15	1	...	...	...	...	...	...	...	...	...	...	1
25	6	8	20	18	..	66	4	4	2	16	11	19	7	84	290	6	3	3	3	4	4	...	10	...	1	30	64
344	46	60	217	328	2	722	60	39	31	337	70	956	92	1,090	4,394	79	39	151	282	74	196	16	137	18	61	546	1,599
559	87	97	377	496	5	1,050	136	68	41	562	163	1,290	255	1,557	6,743	124	56	252	476	127	241	29	188	33	85	1,197	2,808

[a] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[b] Blast, reverberatory, and roasting furnaces; convertors, casting department, and refineries.
[c] Yards, shops, construction, etc.

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TABLE 5.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, during the year ended Dec. 31, 1919.*

Cause of accident.	Killed.			Injured.		
	Number killed.	Per cent of group total.	Per cent of grand total.	Number injured.	Per cent of group total.	Per cent of grand total.
Ore-dressing plants:						
1. Haulage system (cars, motors, etc.)	.....	.....	.....	110	5.36	1.37
2. Railway cars and locomotives	2	8.00	3.23	48	2.34	.60
3. Crushers, rolls, or stamps	1	4.00	1.61	108	5.26	1.34
4. Tables, jigs, etc	1	4.00	1.61	59	2.87	.73
5. Other machinery	6	24.00	9.68	284	13.84	3.53
6. Falls of persons	4	16.00	6.45	199	9.70	2.47
7. Suffocation in ore bins	4	16.00	6.45	5	.24	.06
8. Falling objects (rocks, timbers, etc.)	1	4.00	1.61	200	9.75	2.49
9. Cyanide or other poisoning	1	4.00	1.61	11	.54	.14
10. Scalding (steam or water)	1	4.00	1.61	34	1.66	.42
11. Electricity	2	8.00	3.23	23	1.12	.29
12. Hand tools, axes, bars, etc	.....	.....	.....	167	8.14	2.08
13. Nails, splinters, etc	.....	.....	.....	97	4.73	1.20
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	140	6.82	1.74
15. Other causes	2	8.00	3.23	567	27.63	7.05
Total	**25**	**100.00**	**40.32**	**2,052**	**100.00**	**25.51**
Smelting plants:						
16. Haulage system (cars, motors, etc.)	6	18.75	9.68	344	7.83	4.28
17. Railway cars and locomotives	.....	.....	.....	46	1.05	.57
18. Cranes	6	18.75	9.68	60	1.37	.75
19. Other machinery	4	12.50	6.45	217	4.94	2.70
20. Falls of persons	4	12.50	6.45	328	7.46	4.08
21. Suffocation in ore bins	1	3.12	1.61	2	.04	.02
22. Flying or falling objects (rocks, timbers, etc.)	2	6.25	3.23	722	16.43	8.97
23. Gas (burns or asphyxiation)	1	3.12	1.61	60	1.37	.75
24. Scalding (steam or water)	.....	.....	.....	39	.89	.48
25. Electricity	2	6.25	3.23	31	.70	.39
26. Hand tools, axes, bars, etc	.....	.....	.....	337	7.67	4.19
27. Nails, splinters, etc	.....	.....	.....	70	1.59	.87
28. Burns from matte, slag, or molten metal (pouring or spilling)	2	6.25	3.23	956	21.76	11.88
29. Hot-metal explosions	.....	.....	.....	92	2.09	1.14
30. Other causes	4	12.50	6.45	1,090	24.81	13.55
Total	**32**	**100.00**	**51.62**	**4,394**	**100.00**	**54.62**
Auxiliary works:						
31. Haulage system (cars, motors, etc.)	.....	.....	.....	79	4.94	.98
32. Railway cars and locomotives	1	20.00	1.61	39	2.44	.48
33. Falls of persons	1	20.00	1.61	151	9.44	1.88
34. Falling objects (rocks, timbers, etc.)	.....	.....	.....	282	17.63	3.50
35. Nails, splinters, etc	.....	.....	.....	74	4.63	.92
36. Hand tools, axes, bars, etc	.....	.....	.....	196	12.26	2.44
37. Electricity	3	60.00	4.84	16	1.00	.20
38. Machinery	.....	.....	.....	137	8.57	1.70
39. Failure of ladder, scaffold, or other support	.....	.....	.....	18	1.13	.22
40. Handling hot materials	.....	.....	.....	61	3.81	.76
41. Other causes	.....	.....	.....	546	34.15	6.79
Total	**5**	**100.00**	**8.06**	**1,599**	**100.00**	**19.87**
Grand total	**62**	.....	**100.00**	**8,045**	.....	**100.00**

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TABLE 6.—*Metallurgical Plants. Accidents during the year ended Dec. 31, 1919.*

States.	Ore-dressing plants.[a]					Smelting plants.[b]					Auxiliary works.				
	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)
		Permanent total disability.[c]	Permanent partial disability.[d]	Others.			Permanent total disability.[c]	Permanent partial disability.[d]	Others.			Permanent total disability.[c]	Permanent partial disability.[d]	Others.	
Alabama	1			2	10									1	
Alaska	3			2	23										
Arizona	2		2	98	348	5		4	202	510	1		2	58	218
Arkansas								1		64				1	4
California	1			13	30	1			53	69					
Colorado	2	1	3	24	36	1		4	61	107					
Idaho			1	7	19								2	10	14
Illinois				12	12			14	91	303				15	63
Kansas			3	1	18	1		2	40	115					12
Michigan	2		1	30	71	1		2	26	24					
Minnesota	1			9	25									3	27
Missouri			3	15	134			1	12	258			2	9	182
Montana				25	52	5			53	51				48	85
Nevada	4			41	10	1			25	3	1			26	9
New Jersey	1			7	33	4		1	101	312	1			25	83
New Mexico	1		1	21	93									13	48
New York	3		2	14	190					4			2	5	25
North Carolina				2	12										
Oklahoma	3		4	17	192		1		63	480	1		1	6	67
Oregon				1	6										
Pennsylvania				1	1			1	46	335				39	96
South Dakota				2	15										
Tennessee			3	3	20	1		2	27	101			1	18	112
Texas									27	72					
Utah	1			66	139	4			100	165				25	55
Vermont				1											
Virginia			1	15	22					2				3	3
Washington					2	1		1	28	42					
West Virginia									7	76			2	7	107
Wisconsin				11	29				3	12					1
Other States				9	36	7		2	104	184	1			5	59
Total	25	1	24	[e] 449	1,578	32	1	35	[e] 1,069	3,289	5		12	[e] 317	1,270

[a] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[b] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department, and refineries.
[c] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[d] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[e] "Other serious accidents" in ore-dressing plants, smelting plants, and auxiliary works include 50 cases of permanent partial disability which could not be segregated.

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TABLE 7.—***Metallurgical plants.***—*Accidents during the year ended Dec. 31, 1919.*

	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)
		Permanent total disability.[a]	Permanent partial disability.[b]	Others.	
ORE-DRESSING AND MILLING ACCIDENTS.[c]					
Number killed or injured by—					
1. Haulage (cars and motors)	.....	.....	.....	36	74
2. Railway cars or locomotives	2	.....	.....	11	37
3. Crushers, rolls, or stamps	1	.....	3	32	73
4. Tables, jigs, etc	1	1	.....	18	40
5. Other machinery	6	.....	12	79	193
6. Falls of persons	4	.....	1	64	134
7. Suffocation in ore bins	4	.....	.....	1	4
8. Falling objects (rocks, timbers, etc.)	1	.....	2	30	168
9. Cyanide or other poisoning	1	.....	.....	2	9
10. Scalding (steam or water)	1	.....	1	8	25
11. Electricity	2	.....	1	6	16
12. Hand tools, axes, bars, etc	.....	.....	1	30	136
13. Nails, splinters, etc	.....	.....	1	6	30
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	17	123
15. Other causes	2	.....	2	109	456
Total	**25**	**1**	**24**	**[d] 449**	**1,578**
SMELTER ACCIDENTS.[e]					
Number killed or injured by—					
16. Haulage (cars, motors, etc.)	6	1	5	111	227
17. Railway cars or locomotives	.....	.....	1	23	22
18. Cranes	6	.....	.....	25	35
19. Other machinery	4	.....	6	49	162
20. Falls of persons	4	.....	1	105	222
21. Suffocation in ore bins	1	.....	.....	1	1
22. Flying or falling objects (rocks, timbers, etc.)	2	.....	4	168	550
23. Gas (burns or asphyxiation)	1	.....	.....	17	43
24. Scalding (steam or water)	.....	.....	.....	18	21
25. Electricity	2	.....	1	9	21
26. Hand tools, axes, bars, etc	.....	.....	3	69	265
27. Nails, splinters, etc	.....	.....	1	8	61
28. Burns from matte, slag, or molten metal (pouring or spilling)	2	.....	4	218	734
29. Hot-metal explosions	.....	.....	2	27	63
30. Other causes	4	.....	7	221	862
Total	**32**	**1**	**35**	**[d] 1,069**	**3,289**
AUXILIARY WORKS' ACCIDENTS. (Yards, shops, construction, etc.)					
Number killed or injured by—					
31. Haulage (cars and motors)	.....	.....	.....	17	62
32. Railway cars and locomotives	1	.....	1	9	29
33. Falls of persons	1	.....	.....	39	112
34. Falling objects (rocks, timbers, etc.)	.....	.....	1	50	231
35. Nails and splinters	.....	.....	.....	4	70
36. Hand tools, axes, bars, etc	.....	.....	3	38	155
37. Electricity	3	.....	.....	5	10
38. Machinery	.....	.....	5	30	103
39. Failure of ladder, scaffold, or other support	.....	.....	1	14	3
40. Handling hot materials	.....	.....	.....	11	50
41. Other causes	.....	.....	1	100	445
Total	**5**	.....	**12**	**[d] 317**	**1,270**
Grand total	**62**	**2**	**71**	**[d] 1,835**	**6,137**
Number of wives left widows, 23. Number of children under 16 years of age left fatherless, 28.					

[a] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[b] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[c] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[d] "Other serious accidents" in ore-dressing plants, smelting plants, and auxiliary works include 50 cases of permanent partial disability which could not be segregated.

[e] Smelters include blast, reverberatory, and roasting furnaces; converters: casting department; and refineries. (Iron blast furnaces not included.)

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TABLE 8.—***Ore-dressing plants:*** *Fatalities and injuries, by causes and States, 1913 to 1919.*

	Killed.							Injured.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1816	1917	1918	1919
ACCIDENTS BY CAUSES.														
1. Haulage system (cars, motors, etc.)	1	....	3	3	7	4	....	98	79	106	146	135	107	110
2. Railway cars and locomotives	1	3	2	4	4	1	2	34	38	17	42	29	68	48
3. Crushers, rolls, or stamps	....	2	5	....	3	....	1	64	64	129	168	112	111	108
4. Tables, jigs, etc	....	....	....	....	2	....	1	65	46	59	82	61	92	59
5. Other machinery	2	6	7	11	9	14	6	219	170	299	336	282	368	284
6. Falls of persons	3	3	6	2	9	6	4	238	205	249	373	399	414	199
7. Suffocation in ore bins	1	2	3	3	3	2	4	.....	2	3	4	6	11	5
8. Falling objects (rocks, timbers, etc.)	3	3	....	1	4	....	1	367	222	192	363	371	389	200
9. Cyanide or other poisoning	1	....	....	....	....	1	1	8	9	23	13	24	45	11
10. Scalding (steam or water)	....	....	....	2	1	....	1	24	9	12	35	18	15	34
11. Electricity	1	2	3	2	4	3	2	21	30	38	53	40	63	23
12. Hand tools, axes, bars, etc	....	....	....	1	....	....	....	199	133	235	300	249	298	167
13. Nails, splinters, etc	....	....	....	....	....	....	....	74	78	131	171	193	165	97
14. Flying pieces of rock from sledging or crushing	....	....	....	....	....	....	....	132	50	76	109	302	198	140
15. Other causes	3	2	1	4	1	4	2	434	299	526	929	731	798	567
Total	**16**	**23**	**30**	**33**	**47**	**35**	**25**	**1,977**	**1,434**	**2,095**	**3,184**	**2,952**	**3,142**	**2,052**
ACCIDENTS BY STATES.														
Alabama	....	....	1	....	1	....	1	16	1	6	9	7	25	12
Alaska	....	1	....	....	3	....	3	.....	30	73	127	141	54	25
Arizona	4	5	1	3	6	6	2	335	287	350	524	578	653	448
Arkansas	....	....	....	....	....	1	....	.....	.....	2	20	11	6	.....
California	....	1	2	....	....	3	1	36	111	91	118	30	105	43
Colorado	5	2	7	4	7	2	2	127	103	153	176	214	170	64
Georgia	....	....	....	....	....	....	....	.....	.....	3	9	1	.....	.....
Idaho	1	1	1	....	....	....	....	30	19	55	75	62	62	27
Illinois	....	....	....	....	....	....	....	34	3	3	4	9	26	24
Kansas	....	....	....	....	....	....	....	.....	.....	2	7	15	31	22
Maryland	....	....	....	....	....	....	....	.....	.....	.....	1	.....	.....	.....
Michigan	....	1	....	2	2	2	2	25	51	112	137	88	88	102
Minnesota	....	....	....	....	....	....	1	.....	.....	22	48	40	18	34
Missouri	1	2	2	1	2	1	....	209	180	155	186	175	249	152
Montana	1	4	5	3	6	4	....	189	121	292	168	148	168	77
Nevada	....	2	4	1	4	6	4	83	83	147	133	117	142	51
New Jersey	....	....	1	3	2	....	1	29	27	26	45	57	60	40
New Mexico	1	....	2	4	1	1	1	111	95	131	310	183	229	115
New York	....	....	1	4	1	2	3	.....	12	38	73	77	56	206
North Carolina	....	....	....	....	....	....	....	.....	.....	4	3	14	13	14
Oklahoma	....	....	....	....	2	1	3	11	35	3	15	208	212	213
Oregon	....	....	....	....	....	1	....	3	5	11	2	6	2	7
Pennsylvania	....	....	....	....	....	....	....	.....	.....	.....	1	1	1	2
South Dakota	....	....	....	....	....	....	....	34	10	33	51	23	32	17
Tennessee	....	....	....	1	1	1	....	13	1	27	48	40	17	26
Texas	....	....	....	....	....	....	....	.....	7	.....	7	6	2	.....
Utah	2	4	2	5	5	2	1	531	211	263	711	496	525	205
Vermont	....	....	....	....	....	....	....	.....	.....	3	8	13	22	1
Virginia	....	....	1	1	....	1	....	20	5	35	43	16	30	38
Washington	....	....	....	....	....	....	....	.....	.....	.....	.....	8	26	2
West Virginia	....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....
Wisconsin	....	....	....	....	3	1	....	68	16	51	90	150	55	40
Other States	1	....	....	1	1	....	....	73	21	4	35	18	63	45
Total	**16**	**23**	**30**	**33**	**47**	**35**	**25**	**1,977**	**1,434**	**2,095**	**3,184**	**2,952**	**3,142**	**2,052**

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TABLE 9.—***Smelting Plants:*** *Fatalities and injuries, by causes and States, 1913 to 1919.*

	Killed.							Injured.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
ACCIDENTS BY CAUSES.														
16. Haulage system (cars, motors, etc)	5	3	10	4	7	8	6	386	495	529	814	693	559	344
17. Railway cars and locomotives	5	7	2	2	4	5	....	75	111	61	117	113	87	46
18. Cranes	4	....	2	5	3	2	6	68	55	58	130	146	97	60
19. Other machinery	8	3	5	3	9	13	4	253	250	290	385	375	377	217
20. Falls of persons	10	6	3	9	8	4	4	364	620	499	757	564	496	328
21. Suffocation in ore bins	1	2	1	1	1	....	1	13	1	8	1	73	5	2
22. Flying or falling objects (rocks, timbers, etc.)	3	1	1	4	2	....	2	603	1,052	914	1,438	1,107	1,050	722
23. Gas (burns or asphyxiation)	....	....	3	1	....	....	1	18	59	68	112	48	136	60
24. Scalding (steam or water)	....	1	2	1	2	....	....	45	62	46	132	76	68	39
25. Electricity	2	2	4	1	9	3	2	57	49	46	36	37	41	31
26. Hand tools, axes, bars, etc	....	....	....	....	....	....	....	423	586	633	875	736	562	337
27. Nails, splinters, etc	....	....	....	....	....	....	....	79	96	146	252	208	163	70
28. Burns from matte, slag, or molten metal (pouring or spilling)	4	2	3	1	2	4	2	777	959	894	2,163	1,488	1,290	956
29. Hot-metal explosions	2	....	1	3	2	2	....	148	162	160	217	242	255	92
30. Other causes	3	6	1	1	4	1	4	938	1,116	1,366	2,227	1,839	1,557	1,090
Total	**47**	**33**	**38**	**36**	**53**	**42**	**32**	**4,247**	**5,673**	**5,718**	**9,656**	**7,745**	**6,743**	**4,394**
ACCIDENTS BY STATES.														
Arizona	15	3	7	1	10	9	5	805	553	574	1,112	1,184	1,412	716
Arkansas	....	....	....	....	....	2	....	....	....	....	154	83	53	65
California	2	1	....	1	5	....	1	144	163	163	224	188	289	122
Colorado	1	2	6	1	1	5	1	295	636	404	508	331	269	172
Illinois	2	3	2	2	3	3	....	271	697	782	1,356	749	636	408
Kansas	....	....	1	3	1	2	1	63	89	408	695	283	125	157
Maryland	....	....	....	1	2	1	....	....	....	....	605	359	131	.....
Michigan	....	....	....	1	....	....	1	....	....	....	251	164	104	52
Missouri	....	....	3	2	2	....	....	353	257	304	317	437	482	271
Montana	4	6	6	3	....	2	5	390	538	457	333	238	248	104
Nevada	5	1	....	....	3	2	1	128	33	58	90	132	117	28
New Jersey	2	3	4	6	5	4	4	200	622	630	646	677	682	414
New Mexico	....	....	....	....	....	....	....	....	....	....	....	10	.....	.....
New York	1	1	....	1	....	....	....	15	49	.....	361	.....	.....	4
Oklahoma	3	1	1	1	4	4	....	121	97	262	817	895	479	544
Oregon	....	....	....	....	....	....	....	....	....	....	....	.....	.....	.....
Pennsylvania	....	1	2	3	3	2	....	251	205	339	610	608	396	382
South Dakota	....	....	....	....	....	....	....	....	....	....	1	.....	.....	.....
Tennessee	....	1	1	1	....	....	1	372	326	249	241	.....	.....	130
Texas	....	....	....	....	....	1	....	....	....	....	179	164	178	99
Utah	10	5	3	8	9	4	4	554	605	437	622	556	383	265
Vermont	....	....	....	....	....	....	....	....	....	....	2	.....	.....	.....
Virginia	....	....	....	....	....	....	1	....	....	....	39	.....	.....	2
Washington	....	....	....	1	....	....	1	....	....	....	135	.....	.....	71
West Virginia	1	....	1	....	1	....	....	86	61	106	148	182	107	83
Wisconsin	....	....	....	....	....	....	....	....	....	....	1	36	.....	15
Other States	1	5	1	....	4	1	7	199	742	545	209	469	652	290
Total	**47**	**33**	**38**	**36**	**53**	**42**	**32**	**4,247**	**5,673**	**5,718**	**9,656**	**7,745**	**6,743**	**4,394**

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TABLE 10.—***Metallurgical plants:*** *Injuries and number injured per 1,000 300-day workers employed, by causes, 1913 to 1919.*

Cause of accident.	Number injured.							Number injured per 1,000 300-day workers.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Ore-dressing plants:														
1. Haulage system (cars, motors, etc.)	98	79	106	146	135	107	110	6.07	5.19	5.55	6.22	5.54	4.75	6.58
2. Railway cars and locomotives	34	38	17	42	29	68	48	2.10	2.50	.89	1.79	1.19	3.02	2.87
3. Crushers, rolls, or stamps	64	64	129	168	112	111	108	3.96	4.20	6.75	7.16	4.60	4.93	6.46
4. Tables, jigs, etc	65	46	59	82	61	92	59	4.02	3.02	3.09	3.49	2.50	4.08	3.53
5. Other machinery	219	170	299	336	282	368	284	13.56	11.17	15.65	14.32	11.57	16.34	17.00
6. Falls of persons	238	205	249	373	399	414	199	14.73	13.47	13.03	15.89	16.37	18.39	11.91
7. Suffocation in ore bins	.....	2	3	4	6	11	5	.....	.13	.16	.17	.25	.49	.30
8. Falling objects (rocks, timbers, etc.)	367	222	192	363	371	389	200	22.72	14.58	10.05	15.47	15.22	17.28	11.97
9. Cyanide or other poisoning	8	9	23	13	24	45	11	.49	.59	1.20	.55	.98	2.00	.66
10. Scalding (steam or water)	24	9	12	35	18	15	34	1.49	.59	.63	1.49	.74	.67	2.03
11. Electricity	21	30	38	53	40	63	23	1.30	1.97	1.99	2.26	1.64	2.80	1.38
12. Hand tools, axes, bars, etc	199	133	235	360	249	298	167	12.32	8.74	12.30	15.34	10.22	13.23	10.00
13. Nails, splinters, etc	74	78	131	171	193	165	97	4.58	5.12	6.85	7.29	7.92	7.33	5.81
14. Flying pieces of rock from sledging or crushing	132	50	76	109	302	198	140	8.17	3.28	3.98	4.64	12.39	8.79	8.38
15. Other causes	434	299	526	929	731	798	567	26.87	19.64	27.53	39.58	29.99	35.44	33.94
Total	**1,977**	**1,434**	**2,095**	**3,184**	**2,952**	**3,142**	**2,052**	**122.38**	**94.19**	**109.65**	**135.66**	**121.12**	**139.54**	**122.82**
Number of 300-day workers	**16,154**	**15,225**	**19,107**	**23,470**	**24,372**	**22,517**	**16,708**	.....	.....	.....	.....	.....	.....	.....
Smelting plants:														
16. Haulage system (cars, motors, etc.)	386	495	529	814	693	559	344	15.88	15.31	14.59	16.49	13.68	12.30	11.13
17. Railway cars and locomotives	75	111	61	117	113	87	46	3.09	3.43	1.68	2.37	2.23	1.91	1.49
18. Cranes	68	55	58	130	146	97	60	2.80	1.70	1.60	2.63	2.88	2.13	1.94
19. Other machinery	253	250	290	385	375	377	217	10.41	7.73	8.00	7.80	7.40	8.30	7.02
20. Falls of persons	364	620	499	757	564	496	328	14.97	19.17	13.76	15.34	11.13	10.92	10.61
21. Suffocation in ore bins	13	1	8	1	73	5	2	.53	.03	.22	.02	1.44	.11	.07
22. Flying or falling objects (rocks, timbers, etc.)	603	1,052	914	1,438	1,107	1,050	722	24.81	32.53	25.21	29.13	21.85	23.11	23.35
23. Gas (burns or asphyxiation)	18	59	68	112	48	136	60	.74	1.83	1.87	2.27	.95	2.99	1.94
24. Scalding (steam or water)	45	62	46	132	76	68	39	1.85	1.92	1.27	2.67	1.50	1.50	1.26
25. Electricity	57	49	46	36	37	41	31	2.34	1.52	1.27	.73	.73	.90	1.00
26. Hand tools, axes, bars, etc	423	586	633	875	736	562	337	17.40	18.12	17.46	17.73	14.53	12.37	10.90
27. Nails, splinters, etc	79	96	146	252	208	163	70	3.25	2.97	4.03	5.10	4.11	3.59	2.26
28. Burns from matte, slag, or molten metal (pouring or spilling)	777	959	894	2,163	1,488	1,290	956	31.96	29.66	24.65	43.82	29.37	28.39	30.92
29. Hot-metal explosions	148	162	160	217	242	255	92	6.09	5.01	4.41	4.40	4.78	5.61	2.98
30. Other causes	938	1,116	1,366	2,227	1,839	1,557	1,090	38.59	34.51	37.67	45.11	36.30	34.27	35.25
Total	**4,247**	**5,673**	**5,718**	**9,656**	**7,745**	**6,743**	**4,394**	**174.71**	**175.44**	**157.69**	**195.61**	**152.88**	**148.40**	**142.12**
Number of 300-day workers	**24,309**	**32,336**	**36,262**	**49,363**	**50,659**	**45,439**	**30,917**	.....	.....	.....	.....	.....	.....	.....

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TABLE 11.—***Metallurgical plants:*** *Men employed and the equivalent in 300-day workers, by States, 1913 to 1919.*

ACTUAL NUMBER EMPLOYED.

State.	Ore-dressing plants.							Smelting plants.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Alabama	130	100	57	92	193	315	203	.....	.....	.....	.....	.....	.....	.....
Alaska	.....	225	520	925	467	336	375	.....	.....	.....	.....	.....	.....	.....
Arizona	1,321	1,314	1,776	2,380	2,630	3,319	2,149	2,979	2,491	2,813	3,470	4,398	4,477	1,678
Arkansas	.....	(a)	89	173	163	74	29	.....	.....	.....	410	530	465	712
California	668	581	766	794	755	1,229	633	1,093	917	1,050	1,146	590	639	464
Colorado	785	960	1,219	1,382	1,715	1,885	1,347	2,734	2,810	2,327	3,099	2,864	2,671	1,438
Georgia	(a)	(a)	57	68	82	(a)	21	.....	.....	.....	.....	.....	.....	.....
Idaho	372	441	470	611	642	452	494	.....	.....	.....	.....	(a)	(a)	(a)
Illinois	178	164	(a)	58	156	151	120	1,946	3,228	3,467	4,735	3,731	3,711	2,582
Kansas	(a)	(a)	114	80	206	147	194	800	942	2,584	3,611	2,148	848	791
Maryland	.....	.....	(a)	9	26	.....	(a)	.....	.....	.....	1,300	3,414	2,628	(a)
Michigan	756	1,761	2,354	2,255	2,426	1,948	1,795	(a)	(a)	724	1,001	1,197	994	764
Minnesota	(a)	(a)	241	286	337	561	522	.....	.....	.....	.....	.....	.....	.....
Missouri	1,657	1,466	1,462	1,375	1,523	1,074	878	1,096	980	1,155	1,532	1,560	1,226	1,000
Montana	2,527	1,709	2,451	2,153	2,051	2,360	962	1,224	2,508	3,344	3,200	2,399	2,452	990
Nevada	1,444	1,396	1,401	1,556	1,565	1,450	903	840	726	722	870	1,143	1,297	836
New Jersey	383	440	562	715	537	671	605	757	3,567	4,116	4,870	4,313	4,133	3,002
New Mexico	694	741	762	1,346	891	773	587	(a)	.....	(a)	48	152	(a)	(a)
New York	.....	145	370	567	565	435	793	110	210	.....	570	(a)	(a)	233
North Carolina	(a)	(a)	94	55	46	46	43	.....	.....	.....	.....	.....	.....	.....
Oklahoma	254	404	113	94	452	471	1,071	1,181	1,210	1,679	5,181	5,063	3,064	2,161
Oregon	40	142	69	77	97	67	95	(a)	.....	(a)	22	(a)	(a)	(a)
Pennsylvania	(a)	.....	(a)	25	24	56	52	1,527	1,279	2,015	2,583	3,700	3,803	3,138
South Dakota	360	358	395	362	250	304	288	(a)	.....	.....	16	.....	.....	.....
Tennessee	218	87	328	460	425	266	206	460	299	(a)	200	(a)	(a)	204
Texas	72	57	.....	60	100	72	(a)	(a)	(a)	919	963	1,100	1,116	492
Utah	2,329	2,054	1,664	3,017	4,103	1,942	1,382	1,609	2,779	2,198	2,401	2,658	3,173	1,832
Vermont	.....	.....	131	137	215	193	66	.....	.....	.....	8	.....	.....	.....
Virginia	174	100	488	475	709	550	648	(a)	(a)	(a)	251	(a)	(a)	231
Washington	28	18	(a)	17	63	147	79	(a)	(a)	865	1,045	(a)	(a)	1,449
West Virginia	.....	.....	.....	.....	.....	.....	.....	919	826	834	932	1,090	712	610
Wisconsin	197	175	254	421	247	195	219	.....	(a)	(a)	5	113	(a)	85
Other States	398	290	357	340	450	320	369	1,289,	3,107	515	360	2,213	2,490	3,725
Total	**14,985**	**15,128**	**18,564**	**22,365**	**24,111**	**21,809**	**17,128**	**20,564**	**27,879**	**31,327**	**43,829**	**44,376**	**39,899**	**28,417**

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EQUIVALENT IN 300-DAY WORKERS (CALCULATED).

State.	Ore-dressing plants.							Smelting plants.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Alabama	104	58	19	55	149	191	101	.....	.....	.....	.....	.....	.....	.....
Alaska	.....	253	530	1,111	467	373	445	.....	.....	.....	.....	.....	.....	.....
Arizona	1,529	1,457	1,839	2,637	2,679	3,730	2,420	3,549	2,919	3,034	4,034	5,068	5,425	1,869
Arkansas	.....	.....	75	142	128	57	25	.....	.....	.....	251	609	543	813
California	645	512	812	780	906	1,475	518	1,172	1,047	1,239	1,274	708	766	384
Colorado	867	975	1,219	1,382	1,715	1,885	1,207	3,298	3,356	2,799	3,098	2,864	2,671	1,749
Georgia	.....	.....	48	65	83	.....	13	.....	.....	.....	.....	.....	.....	.....
Idaho	350	388	438	629	597	451	406	.....	.....	.....	.....	.....	.....	(a)
Illinois	149	121	.....	36	143	153	111	2,324	3,892	4,159	5,434	4,398	4,471	2,775
Kansas	.....	.....	85	79	107	103	169	896	1,126	2,454	4,083	2,077	566	938
Maryland	.....	.....	.....	5	18	.....	(a)	.....	.....	.....	1,522	3,726	2,849	(a)
Michigan	507	1,646	2,406	2,346	2,510	1,987	1,879	.....	.....	748	1,089	1,238	1,023	862
Minnesota	.....	.....	161	239	269	315	277	.....	.....	.....	.....	.....	.....	.....
Missouri	1,630	1,339	1,316	1,332	1,307	981	740	1,308	1,177	1,336	1,806	1,898	1,114	892
Montana	3,011	1,725	2,655	2,152	2,019	2,490	1,043	1,489	2,642	4,002	3,265	2,507	2,550	1,151
Nevada	1,697	1,525	1,541	1,713	1,621	1,739	1,084	1,013	843	866	1,018	1,378	1,557	1,005
New Jersey	385	451	607	804	551	679	597	917	4,048	4,958	5,929	5,123	5,013	2,746
New Mexico	842	786	878	1,547	969	841	617	.....	.....	.....	55	76	.....	(a)
New York	.....	104	348	509	522	357	749	118	215	.....	514	.....	.....	208
North Carolina	.....	.....	61	51	38	45	34	.....	.....	.....	.....	.....	.....	.....
Oklahoma	279	394	88	71	346	385	959	1,437	1,114	2,043	5,487	6,093	3,315	2,451
Oregon	37	113	56	40	79	70	66	.....	.....	.....	25	.....	.....	(a)
Pennsylvania	.....	.....	.....	26	17	43	45	1,832	1,509	2,205	3,106	4,442	4,609	3,606
South Dakota	392	431	461	387	292	321	307	.....	.....	.....	8	.....	.....	.....
Tennessee	173	90	264	401	382	222	165	549	351	.....	234	.....	.....	225
Texas	63	62	.....	58	98	61	(a)	.....	.....	1,118	1,172	1,336	1,352	583
Utah	2,804	2,398	2,005	3,579	4,865	2,304	1,613	1,958	3,377	2,674	2,928	3,176	3,861	2,225
Vermont	.....	.....	123	140	194	191	55	.....	.....	.....	2	.....	.....	.....
Virginia	193	81	511	453	690	518	529	.....	.....	.....	290	.....	.....	166
Washington	3	12	.....	14	39	126	64	.....	.....	1,052	1,171	.....	.....	1,598
West Virginia	.....	.....	.....	.....	.....	.....	.....	1,099	980	1,014	1,130	1,269	845	631
Wisconsin	179	132	268	376	213	196	194	.....	.....	.....	5	124	.....	100
Other States	315	172	293	311	359	228	276	1,350	3,440	561	433	2,549	2,909	3,940
Total	**16,154**	**15,225**	**19,107**	**23,470**	**24,372**	**22,517**	**16,708**	**24,309**	**32,336**	**36,262**	**49,363**	**50,659**	**45,439**	**30,917**

a Included in "Other States."

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TABLE 12.—***Metallurgical plants:*** *Days of labor performed and average number of days plants were operated, by States, 1913 to 1919.*

DAYS OF LABOR PERFORMED.

State.	Ore-dressing plants.							Smelting plants.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Alabama	31,250	17,250	5,572	16,488	44,715	57,429	30,286	.....	.....	.....	.....	.....	.....	.....
Alaska	.....	76,046	159,078	333,360	139,960	111,896	133,614	.....	.....	.....	.....	.....	.....	.....
Arizona	458,681	437,061	551,719	790,821	803,567	1,119,017	725,921	1,064,714	875,543	910,120	1,210,377	1,520,283	1,627,441	560,707
Arkansas	.....	.....	22,400	42,730	38,343	17,090	7,475	.....	.....	.....	75,240	182,575	162,975	243,925
California	193,403	153,471	243,708	234,004	271,800	442,391	155,511	351,610	314,162	371,847	382,190	212,400	229,886	115,133
Colorado	260,052	292,491	365,678	414,681	514,500	565,648	362,217	989,335	1,006,670	839,587	929,559	859,200	801,270	524,870
Georgia	.....	.....	14,540	19,430	24,709	.....	3,883	.....	.....	.....	.....	.....	.....	.....
Idaho	105,023	116,527	131,352	188,673	179,238	135,221	121,734	.....	.....	.....	.....	.....	.....	.....
Illinois	44,794	36,325	.....	10,742	43,008	45,840	33,410	697,120	1,167,544	1,247,660	1,630,241	1,319,525	1,341,285	832,610
Kansas	.....	.....	25,584	23,853	32,190	31,005	50,629	268,870	337,890	736,108	1,224,975	623,042	169,679	281,470
Maryland	.....	.....	.....	1,395	5,432	.....	.....	.....	.....	.....	456,500	1,117,802	854,689	.....
Michigan	152,121	493,875	721,634	703,788	752,874	596,086	563,752	.....	.....	224,250	326,669	371,479	306,790	258,605
Minnesota	.....	.....	48,385	71,663	80,703	94,522	83,016	.....	.....	.....	.....	.....	.....	.....
Missouri	483,091	401,615	394,850	399,764	392,225	294,256	221,938	392,467	353,126	400,689	541,880	569,400	334,238	267,727
Montana	903,414	517,458	796,575	645,679	605,705	747,166	312,960	446,645	792,731	1,200,496	979,580	752,157	765,125	345,289
Nevada	509,108	457,581	462,322	514,024	486,255	521,580	325,020	303,846	253,006	259,972	305,372	413,423	467,130	301,590
New Jersey	115,420	135,312	182,230	241,165	165,308	203,831	179,166	275,288	1,214,362	1,487,345	1,778,862	1,536,773	1,503,858	823,662
New Mexico	252,772	235,843	263,494	464,224	290,846	252,373	185,184	.....	.....	.....	16,464	22,680	.....	.....
New York	.....	31,151	104,382	152,632	156,601	107,088	224,526	35,500	64,500	.....	154,200	.....	.....	62,461
North Carolina	.....	.....	18,265	15,186	11,285	13,436	10,207	.....	.....	.....	.....	.....	.....	.....
Oklahoma	83,795	118,217	26,397	21,283	103,933	115,516	287,584	431,065	424,145	612,835	1,646,034	1,827,884	994,487	735,200
Oregon	11,033	33,960	16,879	11,969	23,637	20,854	19,798	.....	.....	.....	7,568	.....	.....	.....
Pennsylvania	.....	.....	.....	7,830	5,165	12,771	13,425	549,640	452,803	661,376	931,710	1,332,500	1,382,795	1,081,704
South Dakota	117,458	129,410	138,182	115,978	87,475	96,189	92,227	.....	.....	.....	2,359	.....	.....	.....
Tennessee	51,822	27,131	79,091	120,370	114,513	66,536	49,565	164,700	105,229	.....	70,200	.....	.....	67,350
Texas	18,964	18,465	.....	17,370	29,330	18,375	.....	.....	.....	335,435	351,495	400,962	405,521	174,764
Utah	841,164	719,243	601,358	1,073,745	1,459,383	691,255	483,852	587,285	1,013,095	802,270	878,426	952,918	1,158,145	667,450
Vermont	.....	.....	36,822	42,074	58,308	57,419	16,420	.....	.....	.....	400	.....	.....	.....
Virginia	57,874	24,330	153,397	136,038	206,921	155,436	158,846	.....	.....	.....	86,956	.....	.....	49,757
Washington	960	3,520	.....	4,059	11,800	37,775	19,302	.....	.....	315,725	351,275	.....	.....	479,405
West Virginia	.....	.....	.....	.....	.....	.....	.....	329,605	294,015	304,368	339,024	380,578	253,608	189,270
Wisconsin	53,678	39,624	80,296	112,854	64,011	58,667	58,116	.....	.....	.....	1,500	37,225	.....	30,059
Other States	94,461	51,623	87,994	93,211	107,699	68,294	82,906	405,076	1,031,948	168,403	129,990	764,837	872,679	1,182,134
Total	**4,846,338**	**4,567,529**	**5,732,184**	**7,041,083**	**7,311,499**	**6,754,962**	**5,012,490**	**7,292,766**	**9,700,769**	**10,878,486**	**14,809,046**	**15,197,643**	**13,631,601**	**9,275,142**

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AVERAGE DAYS ACTIVE.

State.	Ore-dressing plants.							Smelting plants.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Alabama	240	173	98	179	232	182	**149**	.....	.....	.....	.....	.....	.....	.....
Alaska	.....	338	306	360	300	333	**356**	.....	.....	.....	.....	.....	.....	.....
Arizona	347	333	311	332	306	337	**338**	357	351	324	349	346	364	**334**
Arkansas	.....	.....	252	247	235	231	**258**	.....	.....	.....	184	344	350	**343**
California	290	264	318	295	360	360	**246**	322	343	354	333	360	360	**248**
Colorado	331	305	300	300	300	300	**269**	362	358	361	300	300	300	**365**
Georgia	.....	.....	255	286	302	.....	**185**	.....	.....	.....	.....	.....	.....	.....
Idaho	282	264	279	309	279	299	**246**	.....	.....	.....	.....	.....	.....	.....
Illinois	252	221	.....	185	276	304	**278**	358	362	360	344	354	361	**322**
Kansas	.....	.....	224	298	156	211	**261**	336	359	285	339	290	200	**356**
Maryland	.....	.....	.....	155	209	.....	.....	.....	.....	.....	351	327	325	.....
Michigan	201	280	307	312	310	306	**314**	.....	.....	310	326	310	309	**338**
Minnesota	.....	.....	201	251	239	168	**159**	.....	.....	.....	.....	.....	.....	.....
Missouri	295	274	270	291	258	274	**253**	358	360	347	354	365	273	**268**
Montana	358	303	325	300	295	317	**325**	365	316	359	306	314	312	349
Nevada	353	328	330	330	311	360	**360**	362	348	360	351	362	360	**361**
New Jersey	301	308	324	337	308	304	**296**	364	340	361	365	356	364	**274**
New Mexico	364	318	346	345	326	326	**315**	.....	.....	.....	343	149	.....	.....
New York	.....	215	282	269	277	246	**283**	323	307	.....	271	.....	.....	**268**
North Carolina	.....	.....	194	276	245	292	**237**	.....	.....	.....	.....	.....	.....	.....
Oklahoma	330	293	234	226	230	245	**269**	365	351	365	318	361	325	**340**
Oregon	276	239	245	155	244	311	**208**	.....	.....	.....	344	.....	.....	.....
Pennsylvania	.....	.....	.....	313	215	228	**258**	360	354	328	361	360	364	**345**
South Dakota	326	361	350	320	350	316	**320**	.....	.....	.....	147	.....	.....	.....
Tennessee	238	312	241	262	269	250	**241**	358	352	.....	351	.....	.....	**330**
Texas	263	324	.....	290	293	255	.....	.....	.....	.....	365	365	363	**355**
Utah	361	350	361	356	356	356	**350**	365	365	365	365	359	365	**364**
Vermont	.....	.....	281	307	271	298	**249**	.....	.....	.....	50	.....	.....	.....
Virginia	333	243	314	286	292	283	**245**	.....	.....	.....	346	.....	.....	**215**
Washington	34	196	.....	239	187	257	**244**	.....	.....	365	336	.....	.....	**331**
West Virginia	.....	.....	.....	.....	.....	.....	.....	359	356	365	364	349	356	**310**
Wisconsin	272	226	316	268	259	301	**265**	.....	.....	.....	300	329	.....	**354**
Other States	237	178	247	274	239	213	**225**	314	332	327	361	346	350	**317**
Total	**323**	**302**	**309**	**315**	**303**	**310**	**293**	**355**	**348**	**347**	**338**	**342**	**342**	**326**

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TABLE 13.—***Metallurgical plants:*** *Fatalities and number killed per 1,000 300-day workers employed, by causes, 1913 to 1919.*

Cause of accident.	Number killed.							Number killed per 1,000 300-day workers.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
ORE-DRESSING PLANTS.														
1. Haulage (cars and motors)	1	.....	3	3	7	4	.....	0.06	.....	0.16	0.13	0.28	0.18	.....
2. Railway cars or locomotives	1	3	2	4	4	1	2	.06	0.20	.10	.17	.17	.04	0.12
3. Crushers, rolls, or stamps	.....	2	5	.....	3	.....	1	.....	.13	.26	.....	.12	.....	.06
4. Tables, jigs, etc	.....	.....	.....	.....	2	.....	1	.....	.....	.....	.....	.08	.....	.06
5. Other machinery	2	6	7	11	9	14	6	.12	.39	.37	.47	.37	.62	.36
6. Falls of persons	3	3	6	2	9	6	4	.19	.20	.31	.08	.37	.26	.24
7. Suffocation in ore bins	1	2	3	3	3	2	4	.06	.13	.16	.13	.12	.09	.24
8. Falling objects (rocks, timbers, etc.)	3	3	.....	1	4	.....	1	.19	.20	.....	.04	.17	.....	.06
9. Cyanide or other poisoning	1	.....	.....	.....	.....	1	1	.06	.....	.....	.....	.....	.04	.06
10. Scalding (steam or water)	.....	.....	.....	2	1	.....	1	.....	.....	.....	.09	.04	.....	.06
11. Electricity	1	2	3	2	4	3	2	.06	.13	.16	.09	.17	.15	.12
12. Hand tools, axes, bars, etc	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.04	.....	.....	.....
13. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15. Other causes	3	2	1	4	1	4	2	.19	.13	.05	.17	.04	.17	.12
Total	**16**	**23**	**30**	**33**	**47**	**35**	**25**	**.99**	**1.51**	**1.57**	**1.41**	**1.93**	**1.55**	**1.50**
SMELTING PLANTS.														
Number killed or injured by—														
16. Haulage (cars, motors, etc.)	5	3	10	4	7	8	6	.21	.09	.27	.08	.14	.18	.20
17. Railway cars or locomotives	5	7	2	2	4	5	.....	.21	.22	.06	.04	.08	.11	.....
18. Cranes	4	.....	2	5	3	2	6	.17	.....	.06	.10	.06	.04	.20
19. Other machinery	8	3	5	3	9	13	4	.32	.09	.13	.06	.18	.29	.13
20. Falls of persons	10	6	3	9	8	4	4	.41	.19	.08	.18	.15	.09	.13
21. Suffocation in ore bins	1	2	1	1	1	.....	1	.04	.06	.03	.02	.02	.....	.03
22. Flying or falling objects (rocks, timbers, etc.)	3	1	1	4	2	.....	2	.12	.03	.03	.08	.04	.....	.06
23. Gas (burns or asphyxiation)	.....	.....	3	1	.....	.....	1	.....	.....	.08	.02	.....	.....	.03
24. Scalding (steam or water)	.....	1	2	1	2	.....	.....	.....	.03	.06	.02	.04	.....	.....
25. Electricity	2	2	4	1	9	3	2	.08	.06	.11	.02	.18	.06	.06
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28. Burns from matte, slag, or molten metal (pouring or spilling)	4	2	3	1	2	4	2	.17	.06	.08	.02	.04	.09	.06
29. Hot-metal explosions	2	.....	1	3	2	2	.....	.08	.....	.03	.06	.04	.04	.....
30. Other causes	3	6	1	1	4	1	4	.12	.19	.03	.02	.08	.02	.13
Total	**47**	**33**	**38**	**36**	**53**	**42**	**32**	**1.93**	**1.02**	**1.05**	**.73**	**1.05**	**.92**	**1.04**

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TABLE 14.—***Metallurgical plants:*** *Percentage of fatalities and injuries by causes, 1913 to 1919.*

Cause of accident.	Killed.							Injured.						
	1913	1914	1915	1916	1917	1918	1919	1913	1914	1915	1916	1917	1918	1919
Ore-dressing plants:														
1. Haulage (cars and motors)	6.25	.....	10.00	9.09	14.89	11.43	.....	4.96	5.51	5.06	4.59	4.57	3.41	5.36
2. Railway cars or locomotives	6.25	13.04	6.67	12.12	8.51	2.86	8.00	1.72	2.65	.81	1.32	.98	2.17	2.34
3. Crushers, rolls or stamps	.....	8.70	16.67	.....	6.38	.....	4.00	3.24	4.46	6.16	5.28	3.80	3.53	5.26
4. Tables, jigs, etc	.....	.....	.....	.....	4.26	.....	4.00	3.29	3.21	2.82	2.57	2.07	2.93	2.87
5. Other machinery	12.50	26.08	23.33	33.34	19.15	40.00	24.00	11.08	11.85	14.27	10.55	9.55	11.71	13.84
6. Falls of persons	18.75	13.04	20.00	6.06	19.15	17.14	16.00	12.04	14.30	11.89	11.71	13.52	13.18	9.70
7. Suffocation in ore bins	6.25	8.70	10.00	9.09	6.38	5.71	16.00	.....	.14	.14	.13	.20	.36	.24
8. Falling objects (rocks, timbers, etc.)	18.75	13.04	.....	3.03	8.51	.....	4.00	18.56	15.48	9.16	11.40	12.57	12.38	9.75
9. Cyanide or other poisoning	6.25	.....	.....	.....	.....	2.86	4.00	.40	.63	1.10	.41	.81	1.43	.54
10. Scalding (steam or water)	.....	.....	.....	6.06	2.13	.....	4.00	1.21	.63	.57	1.10	.61	.45	1.66
11. Electricity	6.25	8.70	10.00	6.06	8.51	8.57	8.00	1.06	2.09	1.81	1.66	1.36	2.01	1.12
12. Hand tools, axes, bars, etc	.....	.....	.....	3.03	.....	.....	.....	10.07	9.27	11.22	11.31	8.43	9.49	8.14
13. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	3.74	5.44	6.25	5.37	6.54	5.25	4.73
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	.....	.....	.....	6.68	3.49	3.63	3.42	10.23	6.30	6.82
15. Other causes	18.75	8.70	3.33	12.12	2.13	11.43	8.00	21.95	20.85	25.11	29.18	24.76	25.40	27.63
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Smelting plants:														
Number killed or injured by—														
16. Haulage (cars, motors, etc.)	10.64	9.09	26.31	11.11	13.21	19.05	18.75	9.09	8.73	9.25	8.43	8.95	8.29	7.83
17. Railway cars or locomotives	10.64	21.22	5.26	5.55	7.55	11.91	.....	1.77	1.96	1.07	1.21	1.46	1.29	1.05
18. Cranes	8.51	.....	5.26	13.89	5.66	4.76	18.75	1.60	.97	1.01	1.35	1.89	1.44	1.37
19. Other machinery	17.02	9.09	13.16	8.33	16.98	30.96	12.50	5.96	4.41	5.07	3.99	4.84	5.59	4.94
20. Falls of persons	21.27	18.18	7.90	25.00	15.10	9.52	12.50	8.57	10.93	8.73	7.84	7.28	7.36	7.46
21. Suffocation in ore bins	2.13	6.06	2.63	2.78	1.89	.....	3.12	.30	.02	.14	.01	.94	.07	.04
22. Flying or falling objects (rocks, timbers, etc.)	6.38	3.03	2.63	11.11	3.77	.....	6.25	14.20	18.54	15.99	14.89	14.29	15.57	16.43
23. Gas (burns or asphyxiation)	.....	.....	7.90	2.78	.....	.....	3.12	.42	1.04	1.19	1.16	.62	2.02	1.37
24. Scalding (steam or water)	.....	3.03	5.26	2.78	3.77	.....	.....	1.06	1.09	.80	1.37	.98	1.01	.89
25. Electricity	4.26	6.06	10.53	2.78	16.98	7.14	6.25	1.34	.86	.80	.37	.48	.61	.70
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	9.96	10.33	11.07	9.06	9.50	8.33	7.67
27. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	1.86	1.69	2.55	2.61	2.69	2.42	1.59
28. Burns from matte, slag, or molten metal (pouring or spilling)	8.51	6.06	7.90	2.78	3.77	9.52	6.25	18.30	16.90	15.64	22.40	19.21	19.13	21.76
29. Hot-metal explosions	4.26	.....	2.63	8.33	3.77	4.76	.....	3.48	2.86	2.80	2.25	3.12	3.78	2.09
30. Other causes	6.38	18.18	2.63	2.78	7.55	2.38	12.50	22.09	19.67	23.89	23.06	23.75	23.09	24.81
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

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TABLE 15.—***Copper metallurgical plants:*** *Summary of labor and accidents at* ***selected*** *plants, 1917 to 1919.*

	1917		1918		1919	
	Mills.	Smelters.	Mills.	Smelters.	Mills.	Smelters.
Number of plants	20	17	44	25	23	21
Men employed	10,059	13,099	8,222	12,363	4,577	8,934
Number of 300-day workers	11,145	14,530	9,037	14,038	5,298	9,269
Total days' labor (shifts)	3,343,377	4,359,002	2,711,186	4,211,381	1,589,465	2,780,574
Average days active	332	333	330	341	347	311
Number killed	10	19	13	13	8	15
Number injured	1,232	2,154	1,521	2,227	686	1,434
Number killed per 1,000, 300-day workers	.90	1.31	1.44	.93	1.51	1.62
Number injured per 1,000, 300-day workers	110.54	148.25	168.31	158.64	129.48	154.71

TABLE 16.—***Copper metallurgical plants:*** *Accidents by causes at* ***selected*** *plants, 1917 to 1919.*

Cause of accident.	1918				1919			
	Mills.		Smelters.		Mills.		Smelters.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Haulage system (cars, motors, etc.)	2	41	2	147	.....	26	4	109
Railway cars and locomotives	.....	32	.....	43	.....	11	.....	39
Crushers, rolls, or stamps	.....	26	.....	.....	.....	22	.....	.....
Tables, jigs, etc	.....	44	.....	.....	1	18	.....	.....
Cranes	.....	.....	1	43	.....	.....	3	45
Other machinery	7	161	3	114	2	84	1	82
Falls of persons	1	230	1	178	1	86	.....	150
Suffocation in ore bins	.....	7	.....	4	2	.....	1	1
Falling objects (rocks, timbers, etc.)	.....	208	.....	402	.....	67	1	251
Cyanide or other poisoning	.....	31	.....	.....	.....	2	.....	.....
Gas (burns or asphyxiation)	.....	.....	.....	11	.....	.....	1	14
Scalding (steam or water)	.....	6	.....	15	1	9	.....	18
Electricity	.....	42	1	22	.....	6	1	18
Hand tools, axes, bars, etc	.....	175	.....	237	.....	67	.....	120
Nails, splinters, etc	.....	97	.....	66	.....	44	.....	26
Flying pieces of rock from sledging or crushing	.....	42	.....	.....	.....	21	.....	.....
Burns from matte, slag, or molten metal	.....	.....	3	328	.....	.....	.....	232
Hot-metal explosions	.....	.....	2	66	.....	.....	.....	41
Other causes	3	379	.....	551	1	223	3	288
Total	13	1,521	13	2,227	8	686	15	1,434

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TABLE 17.—*Fatality rates in different branches of mineral industries in 1919 compared on a 300-day basis.*

(Length of shift not considered.)

Branch of mineral industry.	Average days active.	Men employed.		Days of labor performed.	Killed.	Number killed per 1,000 employed.	
		Actual number.	Equivalent in 300-day workers (calculated).			On actual time basis.	On 300-day basis.
Metal mines	281	145,262	136,282	40,884,656	468	3.22	3.43
Metallurgical works:							
Ore-dressing plants	293	17,128	16,708	5,012,490	25	1.46	1.50
Smelters[a]	326	28,417	30,917	9,275,142	32	1.13	1.04
Auxiliary works	321	14,642	15,670	4,700,936	5	.34	.32
Coal mines[b]	.....	.....	.....	.....	2,317	.....	.....
Coke ovens:							
Beehive	244	13,333	10,829	3,248,568	10	.75	.92
By-product	328	15,408	16,845	5,053,491	43	2.79	2.55
Quarries (inside)	247	47,802	39,278	11,783,467	90	1.88	2.29
Quarries (outside)	265	27,703	24,516	7,354,841	33	1.19	1.35
Total, 1919[b]	.....	.....	.....	.....	3,023	.....	.....
Total, 1918	272	1,125,505	1,018,642	305,641,671	.....	3.13	3.45

[a] Does not include iron and steel industry.
[b] Coal-mine data not available except for number of fatalities.

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